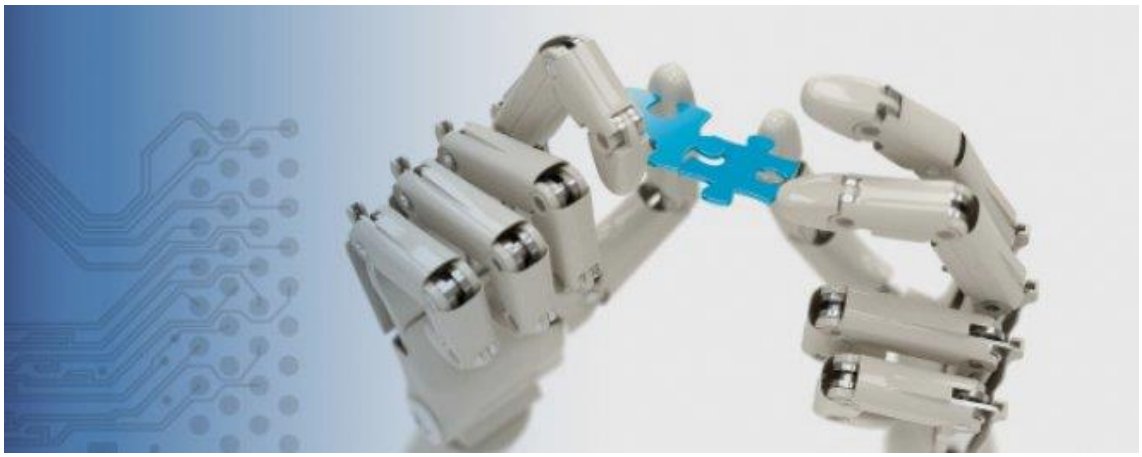
ROBOTICS MASTER

Universitat de Vic



Subject: Kinematics, Dynamics and Trajectory Planning

Session2: Mechanisms, mobility and workspace

Exercixse 2.2: Encoder pulses

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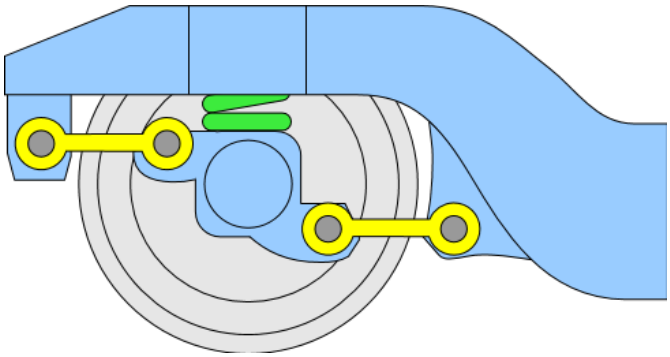
Exercise 2.2

The following image shows the mechanism used for a train suspension. Reproduce it in Geogebra and check what is the workspace w.r.t. the center of the wheel, using the train frame as fixed.



Uploaded Geogebra file to UVIC Virtual campus portal.

* Can you guess its purpose?

A four-bar linkage, is the simplest movable closed chain linkage. It consists of four bodies, called bars or links, connected in a loop by four joints. Generally, the joints are configured so the links move in parallel planes, and the assembly is called a planar four-bar linkage. Its basic purpose is the correlation of the angular rotations of the links connected to the fixed part of the suspension assembly

* Why there is a spring at that point and no other?

To absorb forces generated in the vertical direction

* (optional) What's the name of this mechanism? Are there other designs for the same purpose?

Plannar four-bar linkage applied to trains wheels and suspension systems

* (optional, inspired by a question in class) What do you think was the starting configuration to arrive to such design?

A similar system without the spring, more static

* (optional) The static force of a spring is modeled as F = -K*X, where K is the spring stiffness and X is the deviation from its equilibrium point. The minus sign indicates that the force goes in the opposite direction of the X deviation. Considering that the configuration shown in the figure is the equilibrium configuration, can you simulate and draw the spring force as the mechanism moves?

Drawn the spring simulation in Geogebra

Although these questions have been already depicted in class, they must be answered properly, since the key is how to generate the constraint to make the mechanism move as expected. The Geogebra file(s) must be delivered to check what constraint they used for that.

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